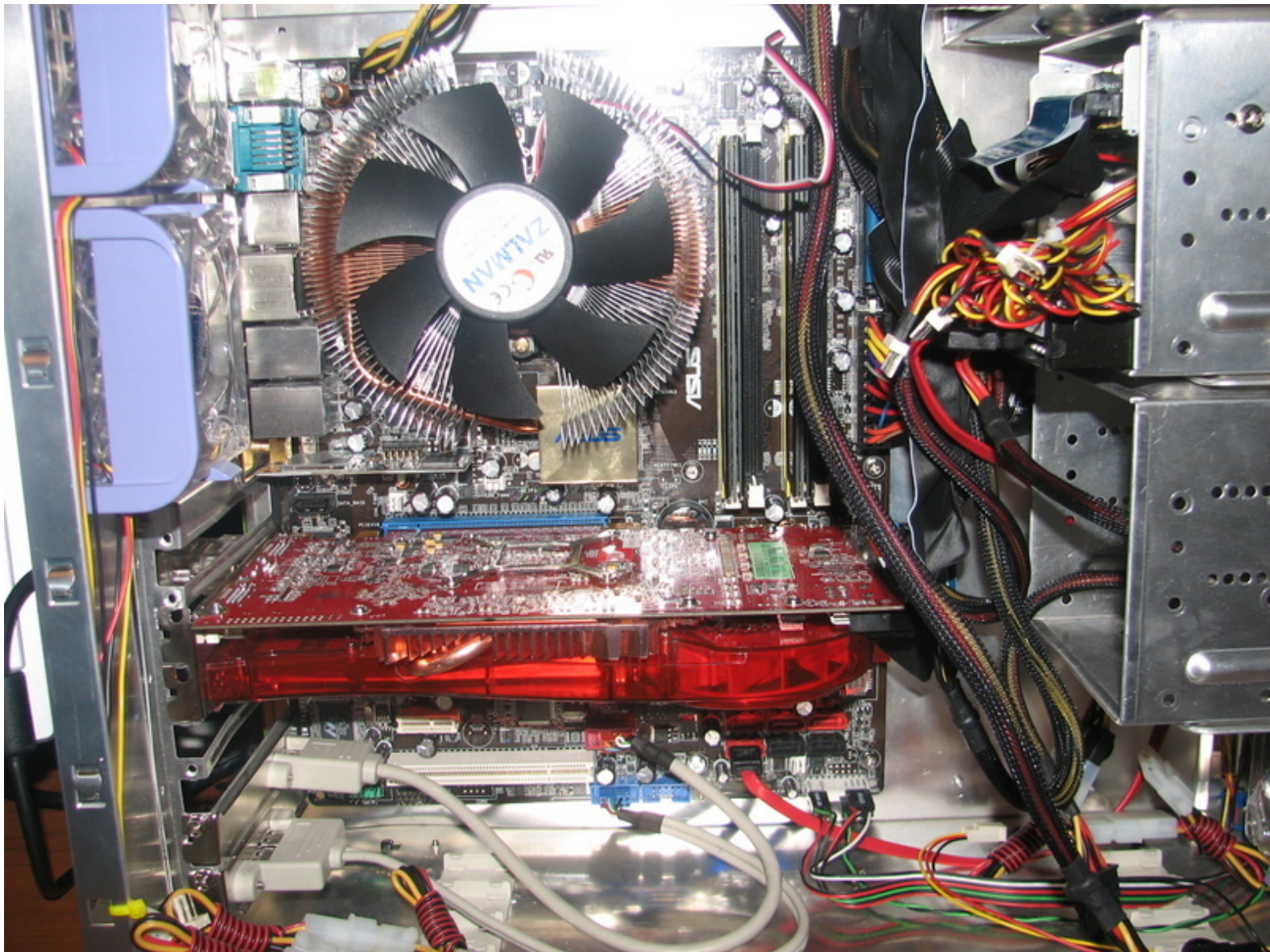




# Temporarily repair a lost-cause graphics card by heating it up in an oven

Graphics card circuit boards can have bad solder joints or bumps under the GPU surface mount chip which can sometimes be temporarily repaired by heating the chip and board in an oven

Written By: Gaspard Leon



## INTRODUCTION

Sometimes you'll have an out-of-warranty video card that is basically now a paper-weight.

If you were going to throw it out anyway and you have an oven and common-sense you have a chance of temporarily repairing the card/chip by re-flowing the solder or heating the bumps under the Surface-mount chip.

Obviously as with any guide that involves an oven you might burn your house down or burn your hands or inhale toxic fumes or whatever, please don't do anything that you don't feel comfortable doing.

However if the warnings don't scare you, continue through the guide.

Please note that the guide has been edited by a few people over the years - some parts are not my original writing

Cheers,

-Gaspard



### TOOLS:

- [Arctic Silver Thermal Paste](#) (1)
- [credit card or piece of cardboard to spread paste](#) (1)
- [Liquid Soldering Flux](#) (1)
- [oven tray / crate](#) (1)
- [Phillips #0 Screwdriver](#) (1)
- [working oven with fan and temerature setting](#) (1)

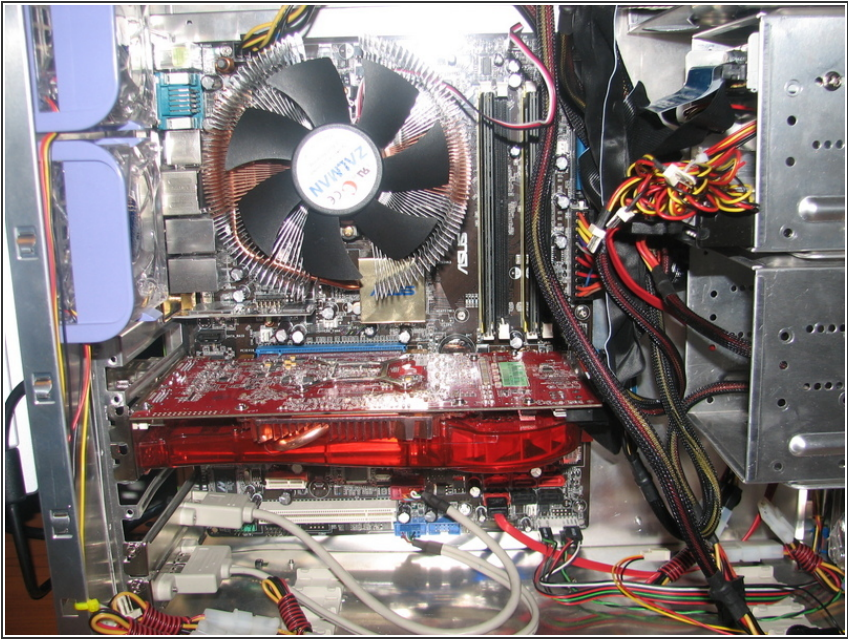


### PARTS:

- [Aluminum Foil](#) (1)
- [Kitchen Paper](#) (1)



## Step 1 — Temporarily repair a lost-cause graphics card by heating it up in an oven



- Remove the video card (if it's installed in the system)

## Step 2 — CHECK YOUR WARRANTY

**APPLIES TO ALL BENQ GRAPHICS CARD EXTENDED WARRANTY 2.2.1.06**

SPQ Technologies is proud to warrant the original purchaser of the graphics card included in this package ("Product"). BenQ Product will be free from defects in material or workmanship for as long as the original purchaser owns the product, whilst given normal wear and proper usage. This warranty is void if the product:

- Was not damaged while being installed.
- Was not damaged by software or hardware from a company or individual other than SPQ Technologies or by motherboard incompatibility.
- Was operated in accordance with SPQ Technologies specifications, instructions and any technical support documents.
- Was not modified or damaged by overclocking, temperature, water leak, accident, disaster, abuse, misuse, power supply, power applications, alteration, repair, modification, or fit or replacement by someone other than SPQ Technologies.
- Third party products, such as motherboards and other system components using this Product are not be covered by this warranty.

SPQ Technologies' liability under this consumer warranty, or in connection with any other claim relating to the Product, is limited to the repair or at SPQ Technologies option, the replacement of the portion of the Product which was defective in material or workmanship. This warranty does not apply to any software component.

The service which is free of charge and the returned Product shall be the sole property of SPQ Technologies. SPQ Technologies warrants the repaired or replaced Products will be free from defects in material or workmanship.

**EXCEPT AS EXPRESSLY STATED ABOVE, SPQ Technologies MAKES NO WARRANTY, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY, NON-INFRINGEMENT OF INTELLECTUAL PROPERTY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR OTHERWISE ON THE PRODUCTS, OR ANY PARTS OR INTERNAL ASSISTANCE OR OTHER LABOR FURNISHED.**

SPQ Technologies reserves the right to inspect and verify the defective areas of any product returned. Please allow 48 hrs processing time more time has been received by SPQ, and 3-5 days for shipping of the replacement product (shipped ground).

\* Product is warranted for the product's lifetime in the United States and Canada, and 10 years from the date of purchase in all countries outside the US and Canada. Against defects in material and workmanship.

- ⚠ If the card is still under warranty, get it repaired by the manufacturer. Otherwise, continue with this guide.

### Step 3 — You will need



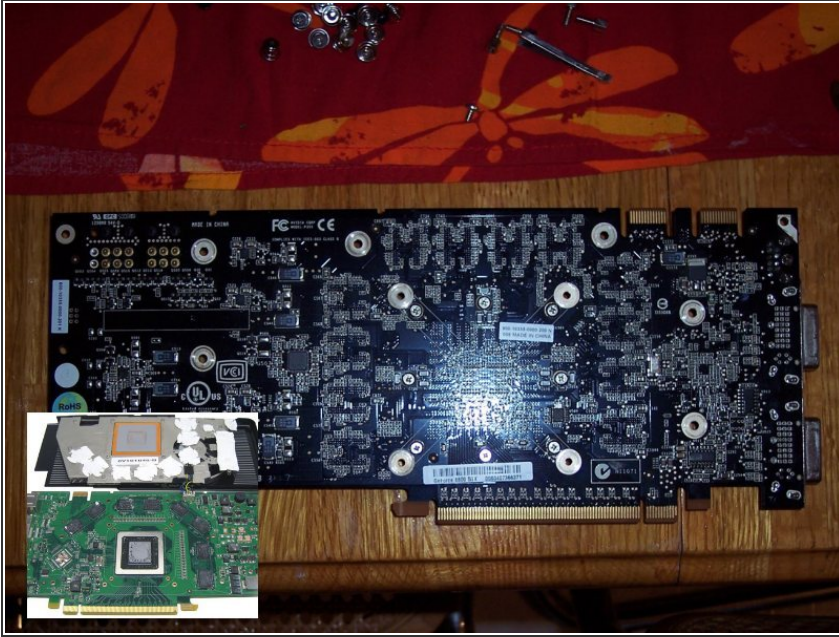
- Precision screwdriver(s) -- usually Phillips #0 and/or #1 for the fan and anything else screwed onto the graphics card
- Aluminium foil to cover heat sensitive components and to prop up the card on your baking tray
- Some thermal paste to replace the paste you clean off the chips
- Paper towel to rub any excess of old heatsink compound from the components
- An oven
- A baking tray

## Step 4 — preparing the oven



- Preheat the oven to 385F (195C).
- If you've already finished this guide once and are baking again, increase the temperature slightly -- 395F (200C) or 400F (205C).
- ❗ Solder melts at different temperatures depending on the type, so if you're squeamish, you might start at 375F.
- Due to new information - most of these temporary repairs are only expanding/shrinking of bumps under the graphics chip surface-mount, so lower heat might work too.

## Step 5 — Preparation




- While the oven is pre-heating:
  - Remove the screws or clips holding your fan and heatsink and any ductwork from the video card.
  - Gently take the fan/heatsink off.
  - Remove any old heatsink compound from the chips (using a paper towel). --NOTE some of the memory or other chips might have heat pads, only remove those if you have a replacement!
- Place the screws in a safe place.
- Be sure there are not many or any plastic components on the board, if there are, they might melt.
- I usually prop up the video card on small scrunched up balls of aluminium-foil (in the corners) so the board doesn't rest on any components.

Step 6 — Solder reflow - melting point

Table 1 The melting point of solder samples measured by DSC

Samples	Melting temperature (°C)
Sn-3.5Ag (as-received)	219.1
Sn-3.5Ag (ball milled for 120 h)	219.5
Sn-3.5Ag-0.7 nanoCu (ball milled for 120 h)	215.0
Sn-3.5Ag-3.0 nanoCu (ball milled for 120 h)	213.6

- **Be patient!** -- if your oven has a window you'll probably see the solder melt when it gets really shiny.
- You want to heat the GPU SLOWLY.
- 5 -10 mins at 200 - 220 C° (395 - 425 F°)
  - My experience: PS3 - 6 minutes, Xbox - 4-6 minutes, desktop boards -12 minutes , laptop boards - 8-12 minutes, GFX - 8-15min.

 Use this as a guide only - not a golden rule, different materials will melt at different rates.


- NOTE: who is "My" in the box above?? - The original Author "Gaspard" here; I never had this step in my version of the guide, and I only ever tried this on a video card, not a laptop or desktop or console
- Re-flowing might work for some circuit-boards, but new more scientific data has revealed that most "quick, temporary" repairs like this are actually caused by expanding and contracting "Bumps" on the bottom of the surface mount chips such as the main GPU or the memory modules (which can happen at lower temperatures as well)



## Step 7

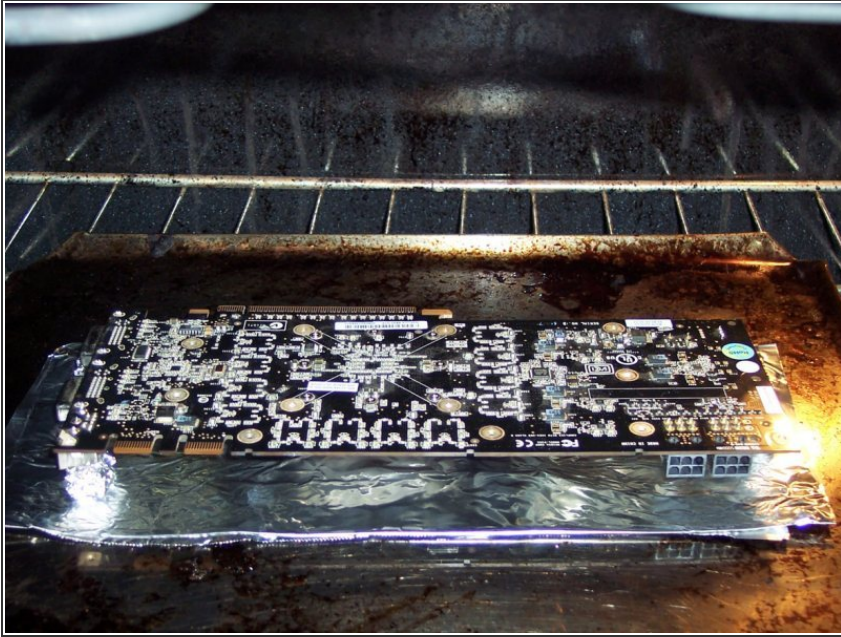


- Once the oven is at the required temperature, set a timer for 8-12 minutes.
- Place the baking sheet or dish in the middle of the oven.

 Do not leave the oven unattended at any cost!



## Step 8



- i** When ready, open the oven door - let smoke out. Keep opening and closing about 5 to 10 times, this equalises temperature differences.
- !** Hold your tray firmly. Be careful, try not to touch anything or make sudden moves as components can be dislodged while the solder is still soft.
- i** You will notice a smell from the molten solder/flux.
- i** Leave the card to cool for a while. Note that using fans to accelerate the cooling process might result in weaker joints or unsuccessful re-flow.

## Step 9 — Make sure the card has cooled enough to touch it before continuing.



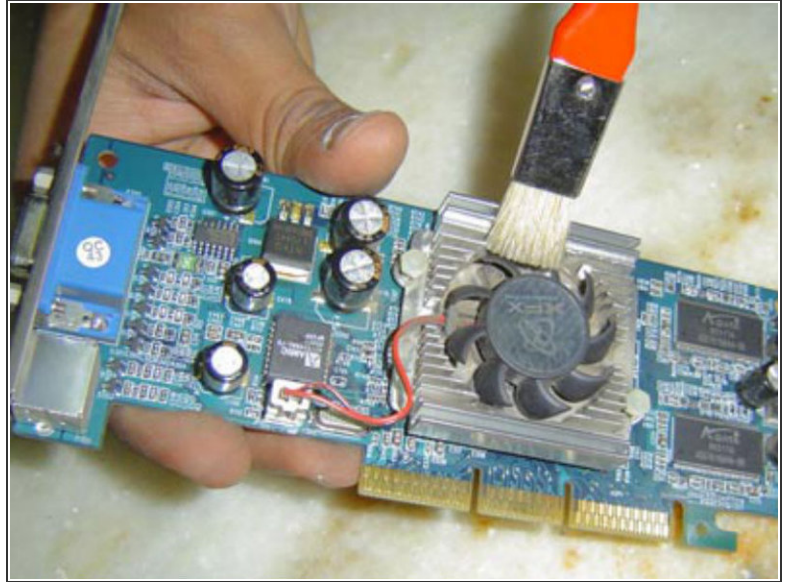
- You have 2 options:
  - 1. Test the card quickly without reinstalling the fan/heatsink.
  - 2. Reinstall the fan/heatsink, then test the card.
- Most people will want to test the card to see if it powers on and passes the POST.
- ⚠ If you are trying it without the heatsink/fan, DO NOT run it for longer than 30 seconds.
- If the card still doesn't work after baking, you may repeat the process and might need to increase its time.

## Step 10 — Installing the heat sink



- Apply some thermal grease onto the main chip and everywhere else where that is necessary.
- ⓘ Use only a small amount of thermal paste and spread evenly over the surface using a piece of cardboard or a credit card for example.
- "NEW" information: You can also just use the "Rice/pea" option where you place a small pea or large grain of rice sized blob of thermal paste in the middle of the cleaned GPU and the pressure of applying the heat-sink will spread it out evenly
- ☑ If there is thermal tape or pads that were removed for the reflow, place these back in their original position.

## Step 11



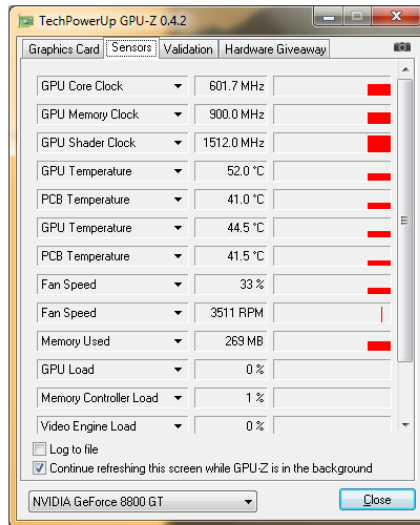
- Place the heat-sink over the GPU carefully, lining up any screws or clips.
- ⚠ Insert and tighten all the screws carefully! They are usually quite small, and the PCB may be damaged if the screws are over tightened.
- ℹ Tighten the screws in an alternating pattern. E.G. Top left, Bottom right, Top right, Bottom left. With more than 4 screws, use a "Star" pattern when tightening the screws ensuring all screws are evenly tightened.
- If you notice any dust, make sure to clean that as well.



## Step 12 — Final checks

### Final Checks

- GPU fan connected?
- GPU seated in slot?
- GPU power connected?
- Monitor connected?
- GPU-Z temp ok?
- No display corruption in games



- Verify that the fan was reconnected (if there is one).
- Verify that the fan spins when the PC is powered up.
- Make sure the GPU works when loading up in Windows, etc.
- ❗ A good program to get is GPU-Z. it can display the GPU temperature on supported cards.
- ❗ GOOD LUCK